ENGINEERING OUTLOOK

AT THE UNIVERSITY OF ILLINOIS

RESEARCH
EDUCATION
PUBLIC SERVICE

UNIVERSITY OF ILLINOIS
LIBRARY
OCT 2 . 1961
CHICAGO

UNIVERSITY OF ILLINOIS BULLETIN · COLLEGE OF ENGINEERING · ENGINEERING EXPERIMENT STATION VOL. 2, No. 7, SEPTEMBER 1961

ENGINEERING RESEARCH AT ALL TIME HIGH: ECRC

The University of Illinois is among the top three U. S. universities in amount of engineering college research, according to results of a survey published by the Engineering College Research Council of the American Society for Engineering Education.

The survey lists 11,000 projects in progress in 121 leading engineering colleges with total expenditures of more than $180,000,000 for the last year.

The Engineering Experiment Station of the University of Illinois reported 350 investigations involving annual expenditures of $7,463,000. Of these, 266 are sponsored by agencies outside the University, including 52 federal and state agencies, 35 private companies, 19 industrial associations, and 5 private foundations. This degree of confidence shown by outside agencies in financing cooperative research programs with the U. of I. reflects the outstanding reputation gained by the Station and College of Engineering faculty members over the years.

The results of the survey were published this past summer in the *Engineering College Research Review,* a biennial publication of the Engineering College Research Council. The *Research Review* compiles the research projects in engineering at every U. S. college or university with a major research program. The *Review* is distributed for $4 per copy by the American Society for Engineering Education, University of Illinois, Urbana.

ELECTRIC HOME HEATING BOOKLET

Illinois engineers or home owners interested in electric heat will find much helpful information in *Home Heating With Electricity* by Professor H. H. Beaty. This booklet compares electric heating with other types of heating systems and briefly discusses the various types of electrical heating units, along with tips on proper installation. It also gives information on insulation requirements and techniques, including recommendations on vapor barrier installation and adequate ventilation procedures. It is not a report on a specific research project, but rather a summary of information to help the consumer make some basic decisions about heating. Single copies are available free of charge from the Office of Information, Mumford Hall, University of Illinois, Urbana.

HIGHWAY TRAFFIC SAFETY CENTER

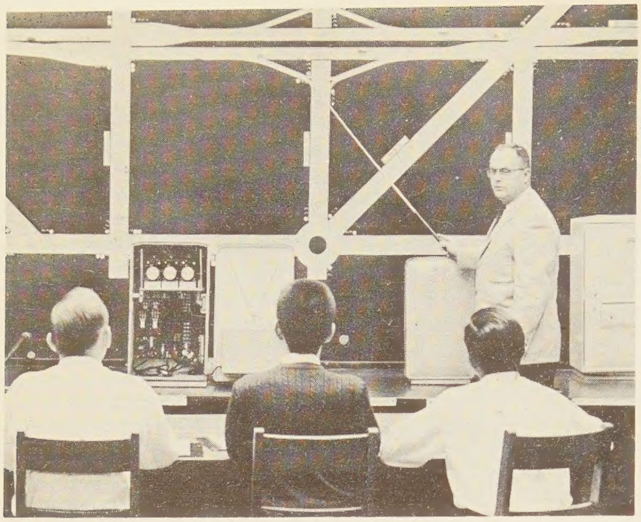
Suppose a town about the size of Albany, New York, were struck by disaster — about a quarter of the population killed and the rest injured. The entire nation would be shocked into mourning for the more than 38,000 dead. Relief would be rushed from all corners of the continent for more than 100,000 injured. It would be considered a national tragedy. Also if much of the tragedy might have been avoided, a major effort would be made to keep such a catastrophe from happening again.

A disaster of the magnitude of our hypothetical example happens in this country every year; not in one place but sprinkled over our highways and streets from coast to coast as automobile accidents. These thousands need not die.

The human cost of automotive transportation, in lives and suffering, can be lowered by research and training. With this aim, the Board of Trustees of the University of Illinois on August 10 approved establishment of a Highway Traffic Safety Center at the University.

In 1958 the Division of Traffic Safety of the Illinois Department of Public Safety requested the assistance of the University in educational and research programs in traffic safety. University President David D. Henry established the Committee on Utilization of University Resources for Traffic Safety to make recommendations for coordinating the University's resources to this end. Twenty departments of the University were found to be interested in an expanded traffic safety program, and 23 state and national organizations encouraged the establishment of the Center.

The new Center will have three primary objectives:



Professor John E. Baerwald, director of the new Highway Traffic Safety Center, also teaches courses in traffic engineering at the University of Illinois. The traffic engineering program is an area of specialization in civil engineering which trains students in the concepts of traffic characteristics and control.

coordination of traffic safety teaching and research; provision of a channel for financial support for training and research; and assistance in the use of traffic safety information. It will accomplish these objectives through formal education, extension education, research, and information services. The activities of the Center will be primarily in departments already existing on the campus.

Chairman of the Committee that developed plans for the Center was A. E. Florio, Professor of Safety Education. Engineering faculty members who were active in the Committee's work were Ellis Danner, Professor of Highway Engineering, and John E. Baerwald, Professor of Traffic Engineering. The highway and traffic engineering activities of the Civil Engineering Department are expected to play major roles in the activities of the Center.

The new Traffic Safety Center will be in the College of Engineering. Professor John Baerwald was named Director by the Board of Trustees when they established the Center. Professor Baerwald heads the traffic engineering group in the Department of Civil Engineering.

A total of 1,725 people died on Illinois highways in 1960. At the normal rate of increase in the number of vehicles on our highways, even if the death rate per hundred million vehicle miles can be held to the present 4.6 level there will be 2,590 people dying on Illinois highways each year by 1970. Reduction of this death rate poses a real challenge to the new Center and to similar state traffic safety centers throughout the nation.

MATERIALS THAT CREEP

The engineer designing a load-carrying member must know the properties of the material and how to use them best. Design procedures for creep have become an increasingly important part of the engineer's work in this area.

Engineering Experiment Station Bulletin 460, *Theoretical and Experimental Analyses of Members Made of Materials That Creep,* gives the engineer procedures and data that should help him deal with the creep problem in design. The new bulletin is by O. M. Sidebottom, G. A. Costello, and S. Dharmarajan of the University of Illinois Department of Theoretical and Applied Mechanics.

Bulletin 460 has three basic purposes. First, it presents a theory for predicting curves for beams, centrally loaded columns, and eccentrically loaded tension members and columns, based on the arc hyperbolic sine curve representation of the isochronous stress-strain diagram. Second, it brings together the results of several experimental investigations comparing theoretical and experimental load-deflection curves for metal members at elevated temperatures and for plastic members in a controlled atmosphere room. Finally, it considers the suitability of using a modified secant formula for predicting the collapse loads and the maximum deflections of eccentrically loaded columns made of materials that creep.

Bulletin 460 is available from Engineering Publications, 112 Civil Engineering Hall, University of Illinois, Urbana, for one dollar per copy.

THE JUNIOR ENGINEERING TECHNICAL SOCIETY

How can a high school student interested in engineering learn enough about the field to know which type he wants to study in college? One way is through JETS, a nationwide organization, sponsored by the Engineers Council for Professional Development and a group of industries and universities to stimulate interest in science and engineering among high school students.

JETS, the Junior Engineering Technical Society, was started in 1950 at Michigan State University. Today there are JETS clubs in high schools in almost every state. These clubs provide opportunities for the students to work on engineering projects. Club activities aid each student in appraising his own abilities and in learning what engineering is all about. Although there is no cost to the student for membership in JETS, the organization offers awards each month for the completion of outstanding engineering projects by its student members.

All JETS clubs can get material from the organization's library, and films and literature are circulated to keep members aware of current happenings in engineering. Some of the clubs sponsor scholarships for their members, and four major conferences are held each year to show and compare projects, exchange views, and to make awards to project winners. As of June, 1961, there were 825 official JETS chapters in 45 states and seven foreign countries. The organization is officially recognized by all major technical societies in the U. S.

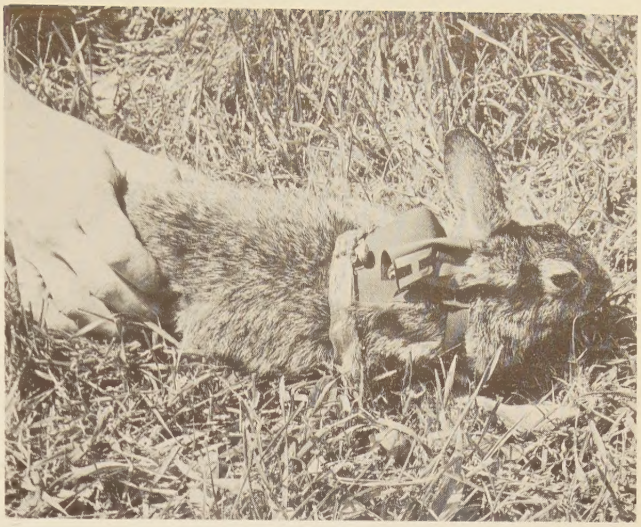
Although the State of Illinois already has a number of JETS chapters, the movement is now receiving statewide coordination. Mr. David Reyes-Guerra of the U. of I. General Engineering Department has been appointed the State Director, and he will be in charge of JETS activities and programs throughout Illinois. While the University of Illinois will cooperate with JETS in Illinois activities, there is no direct affiliation between the Society and the University. For further information write: Mr. David Reyes-Guerra, 313 Transportation Building, University of Illinois, Urbana, Illinois.

People outside the State of Illinois, who desire information, can write to the JETS National Offices, United Engineering Center, New York, New York.

ROVING RABBITS AND RADIO

Where does a rabbit go after dark? A talking rabbit would probably indignantly say, "none of your business," but two University of Illinois scientists have discovered a way to find out without incurring bunny's wrath.

An electrical engineer and a natural scientist have been keeping midnight tabs on rabbits and other wildlife via radio. They have built tiny radio transmitters weighing less than an ounce that can be strapped to an animal's back. A built-in battery keeps the transmitter going for as long as four months. Once equipped with the lightweight transmitting harness, the animal is tracked by a direction-finding radio. On ducks flying a half-mile high the radio can be heard for 60 miles, while on ground animals it has a half-mile range.


The button at the top of this rabbit's harness is a radio transmitter with a built-in battery which will operate continuously from one to four months for tracking studies being made at the University of Illinois. The radio's antenna is in the plastic belt. The initialled ear tag identifies the animal visually.

Research at the U. of I. has already brought new information on the habits of the busy rabbit. Earlier studies had indicated that a wild rabbit seldom ventured farther than the 6- to 8-acre area of his home range. Radio tracking has revealed, however, that in a single night a rabbit often confines his activities to a 2-acre area. With the new device U. of I. investigators have found that

ORDER FORM — send with remittance to Engineering Publications, 112 Civil Engineering Hall, University of Illinois, Urbana, Illinois

☐ Bull. 460, *Theoretical and Experimental Analyses of Members Made of Materials That Creep,* O. M. Sidebottom, G. A. Costello, and S. Dharmarajan. *One dollar.*

☐ Circular 69, Proceedings, Second Sanitary Engineering Conference, *Radiological Aspects of Water Supplies. Two dollars.*

☐ Circular 70, *Engineering Departmental Reports and Theses, 1960. No charge.*

☐ Reprint 62, *Progress Reports of Investigation of Railroad Rails,* Ralph E. Cramer. *Fifty cents.*

☐ *Careers in Engineering,* a guidance brochure for high school students. *No charge.*

September, 1961

the rabbit can't cover as much territory as formerly supposed. He awakens around 5 p.m., eats, and starts his night-time rounds. About 7 a.m. he heads back for bed — completely unaware that radio has revealed his every move throughout the night.

REACTOR "PULSING" PERMITTED

A new dimension is being added to nuclear engineering at the University of Illinois this week. Professor Ross J. Martin, Director of the Engineering Experiment Station, has announced that the College of Engineering's TRIGA nuclear reactor is beginning to "pulse" up to a power level of 250 million watts. The University of Illinois is the only university presently permitted by the AEC to do this. Permission to pulse the reactor was granted by AEC earlier in July.

The reactor has been operating at levels up to 100,000 watts since August 16 of last year according to Professor Martin. He said the pulsing capability was made possible by a grant to the University of more than $51,000 by the National Science Foundation for special fuel and control instrumentation.

The fuel is of a special design made by General Atomic Division of General Dynamics, San Diego, California. The nuclear characteristics of the special fuel automatically end the pulse. The entire pulse takes less than one second.

According to Dr. Marvin E. Wyman, Professor of Physics and Nuclear Engineering, pulsing the reactor gives it some of the research capabilities of much larger and more expensive installations. Dr. Wyman said that the full research possibilities of pulsing will not be known until more work has been done on it.

Dr. Wyman emphasized that although the reactor operation is in terms of watts, the reactor is not used to produce power. "TRIGA is used for teaching in our nuclear engineering program and as a research tool," Dr. Wyman said. "Departments from all parts of the campus use it as a source for radiation in a wide variety of research programs, and of course we can use it to learn many things about reactor design and operation."

In the jargon of the nuclear engineer, the Illinois TRIGA is allowed to have "two dollar" pulses. A "pulse" is a rapid, brief increase in the power level of an operating reactor. A "one dollar" change in reactivity is the amount of fuel that has to be added to a reactor operating at a steady power level to permit a chain reaction with just the "prompt" neutrons. This means that rapid changes in power levels are possible. The Atomic Energy Commission granted the University of Illinois' reactor permission to "pulse" up to twice this level, or "two dollars" worth.

Dr. Wyman explained that the pulse is not achieved by suddenly adding more fuel to the reactor, but rather by removing some of the "poison" or neutron-absorbing material from the fuel already present. This is done, Dr. Wyman said, by literally "blowing" a control rod out of the reactor core with compressed air.

The University's nuclear engineering program in the College of Engineering offers only graduate degrees at the master's and doctoral levels. The research program with the reactor is expected to expand greatly in the next few months with the addition of the pulsing capability.

Editor: R. ALAN KINGERY

UNIVERSITY OF ILLINOIS BULLETIN

Volume 59, Number 8; August, 1961. Published nine times each month by the University of Illinois. Entered as second-class matter December 11, 1912, at the post office at Urbana, Illinois, under the Act of August 24, 1912. Office of Publication, 49 Administration Building (West), Urbana, Illinois.

ENGINEERING OUTLOOK
112 CIVIL ENGINEERING HALL
UNIVERSITY OF ILLINOIS · URBANA

SECOND CLASS
POSTAGE PAID AT
URBANA, ILLINOIS

VOL. 2, No. 7, SEPTEMBER 1961

SERIALS CLERK, U. OF I. LIBRARY
CHICAGO UNDERGRADUATE DIV.
NAVY PIER
CHICAGO 11, ILL.   NTF